

## The Relationship Between Video Game Play and the Acquired Capability for Suicide: An Examination of Differences by Category of Video Game and Gender

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### Abstract

This study examined the relationship between video game (VG) play and the acquired capability for suicide (ACS), as well as the moderating effects of VG category and gender on this relationship. Participants were 228 college students who played VGs on a weekly basis and who completed self-report assessments of VG play, painful and provocative events, and the ACS. Results indicated that there was a significant positive association between hours of VG play and the ACS. The action category of VGs was a significant moderator of the relationship between hours of VG play and the ACS after adjusting for previous painful and provocative events. Gender did not significantly moderate the relationship between hours of VG play and the ACS, and there was no significant three-way interaction between hours of VG play, playing action category VGs, and gender. This suggests that individuals who play many hours of action VGs may be more capable of lethal self-harm if they experience suicide ideation, although this association does not exist for individuals who play other categories of VGs.

SUICIDE IS THE SECOND LEADING cause of death among college students in the United States (U.S.),<sup>1</sup> and accounted for 4,878 deaths in this age group in 2013.<sup>2</sup> A number of risk factors for suicide in this population have been examined, one of which is excessive video game (VG) play.<sup>3</sup> Given that ~70 percent of U.S. college students report being avid VG players,<sup>4</sup> it is important to understand the relationship between VG play and suicide risk in this population.

Research suggests that suicide ideation and planning may be elevated among frequent VG players (i.e., playing more than 5 hours per day)<sup>3</sup>; however, little research has been done to explain this link through a theoretical framework of suicidal behavior. The interpersonal theory of suicide may provide a model that clarifies the relationship between VG play and an individual's capability to engage in suicidal behavior.<sup>5,6</sup> This theory posits a framework for suicide risk that encompasses three key proximal risk factors: perceived burdensomeness, thwarted belongingness, and the acquired capability for suicide (ACS). Perceived burdensomeness and thwarted belongingness are associated with the development of suicide ideation.<sup>5,6</sup> The third construct, ACS, refers to traits (i.e., lowered fear of death and increased tolerance for physical and emotional pain) that physically and mentally

prepare a person to make a lethal or near-lethal suicide attempt<sup>5,6</sup>; this construct is the focus of the current study.

ACS develops in response to the cumulative effects of engaging in physically painful and psychologically provocative life events (i.e., painful and provocative events [PPEs]), which allow for habituation to fear and pain; thus, PPEs directly increase ACS.<sup>7</sup> The theory suggests that individuals who are experiencing suicide ideation, but have low ACS, will not attempt suicide; however, individuals who are experiencing suicide ideation and have elevated ACS are at the greatest risk for lethal or near-lethal self-harm.<sup>5-7</sup> The interpersonal theory of suicide, particularly the ACS component, may provide a theoretical context for findings linking frequent VG play to suicidal behavior.<sup>3</sup> More specifically, violent content in VGs may serve as a behavioral representation for PPEs that increase ACS.

Some literature suggests that violent VG play is associated with increased aggression and stress,<sup>8</sup> which in turn may be associated with ACS. One meta-analysis found that increased violent VG play was associated with heightened aggression consistently across sex and age.<sup>9</sup> Congruently, longitudinal research suggests that it is not aggression that leads to violent VG play, but that violent VG play increases aggression.<sup>10</sup>

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However, the direct link between VG play and aggression is highly debated within the literature and many authors have been reserved in their conclusions regarding causality.<sup>11–14</sup> For example, longitudinal research also suggests that there is no association between violent VG exposure and aggression.<sup>15,16</sup> Additionally, meta-analytic studies suggest that publication biases may result in an incorrect representation of the association between VG violence and aggression.<sup>17</sup> Furthermore, literature suggests that violent media is not associated with increased societal violence,<sup>18</sup> and although some research suggests that violent VG play is associated with increased stress,<sup>8</sup> other research suggests that violent VG play can decrease hostile feelings and stress.<sup>19</sup> Importantly, research has been clear in indicating that violence and aggression are linked to higher ACS.<sup>20</sup>

Collectively, these findings suggest that violent VG play may be associated with increased aggression, which can influence an individual's ability to engage in suicidal behavior through its effects on ACS. The current study has a role in the debate about VG play and aggression as it aims to examine the possible association between VG violence and a real-world outcome that has been associated with aggression (i.e., ACS).

Consistent with this rationale, a recent study found that participants who played a laboratory-based action shooting VG evidenced greater pain tolerance and risk-taking behavior when compared with participants who played a racing VG.<sup>21</sup> These findings support the direct association between violent VG play and ACS.<sup>21</sup> Contrary to these findings, another study did not find a significant relationship between researcher ratings of violent VG exposure and increased pain tolerance, although there was a significant association with increased fearlessness of death.<sup>22</sup> Yet, neither of these studies considered previous PPEs, which may independently increase ACS.

Given previous inconsistent findings, it is important to determine if violent VG play is associated with ACS beyond previous engagement in other PPEs. Additionally, it is critical to understand the interactive effects of hours of VG play per week and categories of VG play (e.g., action) on ACS, which have not yet been examined. We examined differences between individuals who played action VGs and those who did not play action VGs because action VGs contain violent and aggressive content that may be associated with increased ACS as described above. We hypothesized that individuals who endorsed action category VG play would evidence a stronger positive relationship between hours of VG play and ACS than individuals who reported only other categories of VG play, after adjusting for previous PPEs. In addition, as an exploratory analysis, we examined potential gender differences in the relationship between hours of VG play and ACS, and the potential three-way interaction between hours of VG play, category of VG play, and gender. This analysis was pursued due to previously established differences between genders in the variables of interest, in which males evidenced elevated VG play,<sup>23</sup> ACS,<sup>24</sup> and suicide risk.<sup>2</sup>

## Methods

### Participants

The sample was 228 students enrolled at a large public university in southwestern U.S. who endorsed playing VGs weekly. All of the participants were 17 years of age or older

( $M = 19.31$ ,  $SD = 1.61$ ). The majority of participants identified as male ( $n = 147$ ; 65.5 percent). Furthermore, the majority of the sample was Caucasian ( $n = 169$ ; 74.1 percent); 34 participants (14.9 percent) were Hispanic/Latino, 27 participants (11.8 percent) were African American/Black, 9 participants (3.9 percent) were Asian/Asian American, 6 participants (2.6 percent) were American Indian/Native American, and 3 participants (1.3 percent) identified as other races. The percentage for the racial and ethnic identities exceeds 100 percent because participants could select multiple identities. Only 14 percent of our sample had a previous psychiatric diagnosis.

### Measures

**Demographics, history, and VG play questionnaire.** This form assessed demographics and psychiatric history. Additionally, participants answered questions about their VG play, including how many hours they typically spent playing VGs per week and the categories of VGs that they played. If participants played VGs, they were asked to select the categories of VGs that they played from the following list: Action (First person shooter, horror, fighting, sports, and crime/war-themed games. e.g., Call of Duty series, Halo series, Left 4 Dead, Resident Evil series, Street Fighter series, Mortal Kombat series, Tomb Raider, and Grand Theft Auto series); Adventure (Role-playing games, massively multiplayer online games, and adventure games. e.g., The Sims, World of Warcraft, and RuneScape); Simulation (Wii/Playstation Move games, vehicle simulation, sports, racing, and music games. e.g., Wii Fit, flight simulators, Madden NFL series, Midnight Club series, Guitar Hero, and Rock Band); and Educational/Traditional (Puzzle, traditional, and educational games played on a computer or smart phone. e.g., Solitaire, Minesweeper, Chess, Mahjong, and Tetris). The examples listed herein were also provided to participants.

**Painful and provocative events scale.**<sup>25</sup> The Painful and Provocative Events Scale (PPES) is a 24-item self-report measure of the frequency of participation in various PPEs across the lifetime, utilizing a 5-point ordinal response metric. The response options include Never, Once, 2–3 times, 4–20 times, or More than 20 times. These responses are then assigned numeric scores ranging from 0 to 4 and summed to obtain an overall PPES score. Cronbach's alpha for the current sample was 0.78.

**Acquired capability for suicide scale.**<sup>25</sup> The Acquired Capability for Suicide Scale (ACSS) is a 20-item self-report measure of ACS, which utilizes a 5-point ordinal response metric ranging from 0 (not at all like me) to 4 (very much like me). In line with previous research,<sup>25</sup> seven items are reverse coded, and then responses are summed to create a total score in which higher scores indicate greater ACS. The items assess for increased pain tolerance and reduced fear of death, which are theoretical components of ACS. Cronbach's alpha for the current sample was 0.84.

### Procedure

Participants were recruited from general psychology courses through an online experiment registration portal as part of a larger study. There were no exclusion criteria;

however, only participants who endorsed VG play were included in the current study. Participants completed measures cross-sectionally through an online survey program after providing electronic informed consent. All participants were provided with contact information for crisis hotlines and local mental health services at the end of the survey. The university's Institutional Review Board approved all procedures.

## Results

Bivariate correlations and descriptive statistics are presented in Table 1. To test the hypotheses that action category VG play and gender would each moderate the association between hours of VG play and ACS after adjusting for PPEs, we used a bootstrapped, nonparametric moderation procedure.<sup>26</sup> Visual examination of the data distributions indicated that hours of VG play evidenced positive skew; however, the PPES and ACSS scores were normally distributed. Participants were coded into the action category group if they endorsed playing action VGs (either with or without endorsing other categories), whereas participants who endorsed playing VGs only in other categories were coded in the nonaction group. The majority of participants were coded as action VG players ( $n = 164$ ; 71.9 percent).<sup>a</sup> A significant direct effect was found for hours of VG play ( $b = 0.25$ ,  $p = 0.03$ ), but not action category ( $b = 3.61$ ,  $p = 0.09$ ) or gender ( $b = 2.20$ ,  $p = 0.29$ ). Action category moderated the effect of hours of play on ACS ( $b = 0.91$ ,  $p = 0.01$ ); however, no other two- or three-way interactions were significant. See Table 2 for direct effect and interaction coefficients.

Simple slope analyses were conducted to probe the interaction (Fig. 1). The nature of the interaction between VG category and hours of VG play indicated that there was a significant positive relationship between hours of VG play and ACS when participants reported playing action VGs ( $b = 1.03$ ,  $p = 0.003$ ), but no such significant relationship among participants who reported playing other categories of VGs ( $b = 0.12$ ,  $p = 0.62$ ). Therefore, individuals who played more hours of action VGs evidenced the highest ACS. Although there was no significant interaction between gender and hours of VG play ( $b = -0.67$ ,  $p = 0.05$ ), it approached significance. Trends in the data suggested that males who played fewer hours of VGs evidenced the highest ACS, and males who played greater hours of VGs evidenced the lowest ACS. However, this trend was opposite, but less pronounced,

in women. That is, there was a negative association between hours of VG play and ACS in men, but this association was positive in women.

## Discussion

The aim of the current study was to further elucidate the relationship between VG play and ACS. The results indicated that participants who played action category games (i.e., games that usually involve more violence) evidenced a positive relationship between hours of VG play and ACS, even after adjusting for the variance accounted for by previous PPEs; this pattern of results was not evident in participants who played only other categories of VGs. Furthermore, gender did not significantly moderate the association between hours of VG play and ACS, although trends suggested that the influence of hours of VG play on ACS was more pronounced in men. There was no significant interaction between playing action category VGs and gender, nor a significant three-way interaction between hours of VG play, playing action category VGs, and gender.

These results suggest that it is not overall hours of VG play that are associated with ACS; it is only hours of VG play within the action category that are associated with higher ACS. It is possible that individuals who play more hours of action VGs are being exposed to violent and graphic content that may directly increase ACS and indirectly affect ACS through increased aggression. In fact, in some VGs (e.g., Grand Theft Auto), players are able to attempt or die by suicide, which could provide a suicide-specific behavioral representation that leads to increased ACS. Additionally, it is possible that categories of VGs other than action (e.g., adventure, simulation games) may also contain violent content; therefore, our coding of action and nonaction VGs may provide a conservative estimate of the association between violent VG play and ACS.

These findings are consistent with literature indicating that playing violent VGs is linked to heightened aggression<sup>9,10</sup> as well as indicators of ACS.<sup>21,22</sup> The interpersonal theory of suicide suggests that increased violent and aggressive behaviors are PPEs,<sup>5-7</sup> which could lead to a suicide attempt through elevated ACS if an individual is experiencing suicide ideation.<sup>5-7</sup> This study did not focus on relationships between VG play and suicide ideation as such relationships were outside the scope of the design, but it is also possible that variables associated with excessive VG play may be linked to

TABLE 1. CORRELATIONS AND DESCRIPTIVE STATISTICS

	1	2	3	4	5
1. Gender	—				
2. Action	0.62***	—			
3. Hours	0.34***	0.23**	—		
4. PPES	0.19**	0.22**	0.18**	—	
5. ACSS	0.25***	0.28***	0.16*	0.27***	—
Mean	—	—	8.30	17.35	66.83
Standard deviation	—	—	7.84	8.18	11.71

Gender: male (1)/female (0); Action: yes (1)/no (0), endorsed playing action category video games; Hours: number of hours spent playing video games during a typical week.

\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

ACSS, Acquired Capability for Suicide Scale; PPES, Painful and Provocative Events Scale.

TABLE 2. MODERATION RESULTS: EXAMINING THE DIRECT EFFECTS OF AND INTERACTIONS BETWEEN HOURS OF VIDEO GAME PLAY, PLAYING ACTION CATEGORY VIDEO GAMES, AND GENDER PREDICTING THE ACQUIRED CAPABILITY FOR SUICIDE AFTER ADJUSTING FOR PREVIOUS PAINFUL AND PROVOCATIVE EVENTS

Predictor variable	b	SE	t	95% CI (lower limit, upper limit)	p
Criterion variable: ACSS ( $F[4, 205] = 10.94$ , $R^2 = 0.18$ , $p < 0.001$ )					
Constant	62.05	1.49	41.53	59.10, 64.99	<0.001
PPES	0.35	0.09	3.99	0.18, 0.52	<0.001
Hours	0.25	0.11	2.18	0.02, 0.47	0.031
Action	3.61	2.13	1.70	-0.59, 7.81	0.091
Gender	2.20	2.07	1.06	-1.88, 6.27	0.290
Criterion variable: ACSS ( $F[7, 202] = 7.75$ , $R^2 = 0.21$ , $p < 0.001$ )					
Constant	62.09	1.76	35.28	58.62, 65.56	<0.001
PPES	0.32	0.09	3.74	0.15, 0.49	<0.001
Hours	0.12	0.24	0.50	-0.36, 0.60	0.619
Action	4.49	2.75	1.64	-0.93, 9.91	0.104
Gender	2.77	4.10	0.68	-5.32, 10.85	0.501
Hours $\times$ Action	0.91	0.32	2.87	0.28, 1.53	0.005
Hours $\times$ Gender	-0.67	0.34	-1.95	-1.34, 0.01	0.053
Action $\times$ Gender	-1.39	4.83	-0.29	-10.91, 8.14	0.774
Criterion variable: ACSS ( $F[8, 201] = 6.88$ , $R^2 = 0.22$ , $p < 0.001$ )					
Constant	62.41	1.80	34.73	58.86, 65.95	<0.001
PPES	0.32	0.09	3.75	0.15, 0.49	<0.001
Hours	0.21	0.26	0.80	-0.31, 0.73	0.428
Action	3.36	3.04	1.11	-2.63, 9.34	0.270
Gender	3.04	4.11	0.74	-5.07, 11.15	0.461
Hours $\times$ Action	0.46	0.60	0.78	-0.71, 1.64	0.438
Hours $\times$ Gender	-0.90	0.44	-2.08	-1.76, -0.05	0.039
Action $\times$ Gender	-0.88	4.87	-0.18	-10.48, 8.71	0.856
Hours $\times$ Action $\times$ Gender	0.62	0.70	0.89	-0.76, 1.99	0.377

Hours: Number of hours spent playing video games during a typical week; Action: yes (1)/no (0) to playing action category video games; Gender: male (1)/female (0); Hours  $\times$  Action: Multiplied effects of number of hours spent playing video games during a typical week and yes/no to playing action category video games (hours were centered before creating the interaction;  $\Delta R^2 = 0.32$ ,  $p = 0.005$ ); Hours  $\times$  Gender: Multiplied effects of number of hours spent playing video games during a typical week and gender (male/female; hours were centered before creating the interaction;  $\Delta R^2 = 0.02$ ,  $p = 0.053$ ); Action  $\times$  Gender: Multiplied effects of yes/no to playing action category video games and gender (male/female;  $\Delta R^2 = 0.00$ ,  $p = 0.774$ ); Hours  $\times$  Action  $\times$  Gender: Multiplied effects of number of hours spent playing video games during a typical week, yes/no to playing action category video games, and gender (male/female; hours were centered before creating the interaction;  $\Delta R^2 = 0.01$ ,  $p = 0.377$ ).

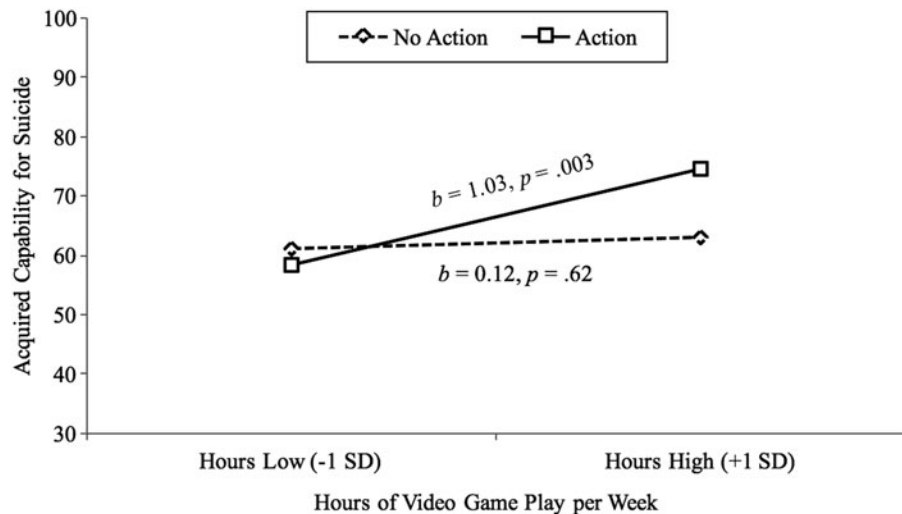
CI, confidence interval; SE, standard error.

suicide ideation through separate pathways (e.g., through problematic use and reduced psychosocial well-being).

Clinically, the findings of the current study indicate that college students who frequently play action category VGs may have an elevated ability to engage in lethal self-injury

(i.e., ACS). Although these results are cross-sectional, we recommend that clinicians ask clients who play VGs if they play action category VGs when conducting suicide risk assessments. Empirical implications include the importance of exploring the effects of exposure to virtual reality violence or

**FIG. 1.** Simple slope analysis of the relationship between hours of video game play per week and the acquired capability for suicide by video game category, after adjusting for painful and provocative events. Participants who played action category games evidenced a significant positive association between hours of video game play and the acquired capability for suicide. Participants who played other categories of video games did not evidence a significant relationship between hours of video game play and the acquired capability for suicide.



indirect exposure to PPEs as potential contributors to ACS. Violent or suicidal behaviors may be modeled for individuals who play action VGs, which may increase the likelihood that players will engage in such behaviors in their lives (i.e., PPEs). In turn, these individuals may develop ACS through their exposure to PPEs.

This study has several limitations that deserve mention. First, our sample was university students in the southwestern U.S. who were predominately Caucasian and male; therefore, the results may not generalize to other groups. Second, this study utilized a cross-sectional design and self-report assessments, which do not allow us to examine the temporal relationships between variables and which create a potential for bias in reporting. Future research should consider examining our findings in more diverse samples across different geographic regions, utilizing a longitudinal research design, and employing behavioral measures (as opposed to retrospective self-report questionnaires; e.g., the suicide implicit association task to assess suicide risk, objective recording of hours of VG play) to assess variables of interest.

In conclusion, the current study extends previous findings and provides a context for previous research regarding suicide risk (e.g., ACS) and VG play. The findings suggest that individuals who play greater hours of action category VGs, which tend to be more violent, evidence the highest ACS even after adjusting for other PPEs. Therefore, these individuals may be at greater risk for a lethal or near-lethal suicide attempt when suicide ideation is present.

## Note

a. Given this low prevalence of psychiatric diagnosis in our data (14 percent) and the lack of a significant point-biserial correlation between history of psychiatric diagnosis (history = 1, no history = 0) and ACSS scores ( $r = 0.07$ ,  $p = 0.31$ ), we did not include psychiatric history in our analyses.

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## Author Disclosure Statement

No competing financial interests exist.

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